

REMARKS

I. ANTICIPATION REJECTION

In paragraph 2 of the Office action, the Examiner has again rejected claims 1-11, 13, 15-16, and 18-20 under 35 U.S.C. 102(e) as anticipated by Yang et al. (U.S. Patent No. 6,036,726). Applicant respectfully traverses this rejection and requests reconsideration and withdrawal thereof.

As Applicant has pointed out (and as the Examiner apparently admits), Yang et al. does not contain examples that disclose each of the elements of Applicant's claimed invention. Nevertheless, the Examiner insists that Yang et al. anticipate the claimed invention, because the examples "do not constitute the entire disclosure." However, in considering the "entire disclosure," the Examiner sets forth (at pages 7-8 of the Office action) numerous different elements of the claims, and maps these to different portions of the Yang et al. disclosure. The Examiner herself makes it very clear that there is no single embodiment disclosed within Yang et al. that teaches each and every element of Applicant's claims. While Applicant agrees that there is more to the disclosure of Yang et al. than the examples, and that the Examiner is justified in looking at the entire Yang et al. disclosure to determine whether anticipation exists, Applicant strongly disagrees with the Examiner's methodology for making this assessment and her conclusion that Yang et al. anticipates the claims. In order for Yang et al. to anticipate the claims, it is necessary for Yang et al. to disclose a single embodiment of their process that contains every limitation recited in the claims. Once the Examiner must pick and choose from among different ranges disclosed in different portions of Yang et al., the Examiner has moved away from anticipation and

into obviousness, and should make her rejections on that basis. However, while the Examiner's application of the Yang et al. reference is one that requires an obviousness rationale, she continues to improperly make the rejection one of anticipation, as explained in more detail below.

First, it is inappropriate and incorrect for the Examiner to use disclosed ranges for different parameters, such as temperature and pressure, and cobble these together into an allegation of anticipation. Nowhere does Yang et al. suggest increasing pressure to a range that, for a given dissolution temperature, would be above that of the equilibrium vapor pressure of the solvent at that temperature. None of the examples of Yang et al. do this or suggest it, as explained above and in Applicant's previous response, which is incorporated herein by reference. To the contrary, Yang et al. state that "[t]he pressure at which the solvating step is carried out will depend upon the solvent, since the pressure is the result of solvent vapor pressure." Column 6, lines 56-58. Yang et al. disclose a variety of different temperature ranges (spanning around 240 °C), but disclose only two (very wide) pressure ranges. There is no suggestion of which pressure to use with which temperature, or even of which pressure range to use with which temperature range. Clearly, this does not constitute a teaching of a specific embodiment of a high pressure (i.e., an externally imposed pressure, so that it can be higher than the equilibrium vapor pressure of the solvent at the dissolution temperature) combined with a low dissolution temperature.

Second, it is inappropriate and incorrect for the Examiner to use disclosed dissolution time ranges, taken from yet another portion of the Yang et al. disclosure, and ascribe these to particular temperature and pressure combinations, when there is

no indication in Yang et al. that specific temperature and pressure combinations lead to particular dissolution times. There certainly is no suggestion in Yang et al. that a combination of temperatures below 155 °C and high pressure give dissolution times of around 45 minutes or less. While Yang et al. suggest that residence times for decolorization can be quite low, achieving these low residence times requires a substantially higher temperature than that recited in the claims. For example, Yang et al. state at column 7, lines 18-21 that a dissolution time of 5 minutes was achieved. However, the dissolution temperature was 170 °C, considerably higher than the maximum recited in Applicant's claims. Many of the examples of Yang et al. do not even state what the dissolution times are. Those that do have either long dissolution times (1 hour, Examples 9, 10), high temperatures (159-167 °C, Examples 9, 10), or both.

Third, Applicant notes that the Examiner appears to look at the pressure ranges recited in Yang et al., the temperature ranges recited in Yang et al. and the dissolution times recited in Yang et al. (none of which are disclosed specifically as having been used or obtained together), and to compare each of these separately to those recited in Applicant's specification. Because the Examiner perceives there to be overlap, she finds anticipation. However, the claims do not recite merely separate ranges (in separate claims) that overlap with those of Yang et al. The claims recite a combination of low temperatures (below about 155 °C) and high pressures (i.e., above those achieved by allowing the solution to equilibrate to its equilibrium vapor pressure at the low temperature, and obtained by a source of pressure external to the solvent/nylon system) to achieve low dissolution times (less than about 45 minutes).

This combination forms the inventive concept of Applicant's claims, and it is not fairly taught or suggested anywhere in Yang et al. To the extent that Yang et al. suggest increasing pressure with an inert gas, there is no disclosure in Yang et al. that this should be coupled with the decreased dissolution temperature recited in the claims, or that this coupling would lead to dissolution times of about 45 minutes or less. In fact, nowhere does Yang et al. disclose a specific embodiment of their invention where inert gas pressurization was used, what dissolution temperature was used, what the dissolution time was, etc.

For at least these reasons, Applicant respectfully submits that Yang et al. fails to anticipate Applicant's claimed invention, and the Examiner's rejection should be withdrawn.

II. OBVIOUSNESS REJECTIONS

A. YANG ET AL. AND MEYER

In paragraph 4 of the Office action, the Examiner has rejected claims 10 and 11 under 35 U.S.C. § 103(a) as obvious over Yang et al. in view of Meyer (U.S. Patent No. 4,334,056). Applicant respectfully traverses this rejection and requests reconsideration and withdrawal thereof.

Applicant has explained above why Yang et al. does not anticipate claims 1-11, 13, 15-16, and 18-20. Meyer fails to cure the deficiencies of Yang et al. mentioned above. Meyer, whether or not it discloses lower nylon dissolution temperatures, does not teach the inventive concept recited in the claims, namely the combination of low dissolution temperatures with elevated pressure to achieve short dissolution times.

In addition, Applicant's continue to object to the Examiner's combination of Meyer with Yang et al. Meyer, as Applicant's have explained previously, is not directed to the dissolving the nylons that are decolorized in Yang et al. The Examiner asserts, at page 10 of the Office action, that Meyer mentions nylon 6,6. Applicant agrees. However, this is not sufficient to justify combining the teachings of Meyer with those of Yang et al. Meyer is directed to methods for producing powdered coating compositions, not to recycling nylon. In order to obtain those powdered coating compositions, Meyer requires a particular type of nylon (i.e., a polyamide having at least 10 aliphatically bound carbon atoms per carbonamide group), which are dissolved in ethanol at temperatures between 130 °C and 150 °C. The portion of the disclosure to which the Examiner refers merely indicates that polyundecanoic acid amide and/or polylauryllactam may be combined with a number of additional polymers, including nylon 6 and nylon 6,6.

However, there is no disclosure in Meyer that such a combination will be subject to the dissolution process disclosed in Meyer, or that if this were to be carried out, the nylon 6,6 or nylon 6 would dissolve. Meyer is concerned with the dissolution of the specific nylon polymer required for his powdered coating composition, not with dissolution of other nylon "fillers." Finally, to the extent that such additional polymers are combined with the specific nylon polymer required by Meyer, the disclosure of Meyer indicates that these polymers either degrade or react with the polyundecanoic acid amide and/or polylauryllactam (see Example 5 of Meyer). Degradation or reaction of any nylon 6,6 added to the Meyer system would completely defeat the purpose of Applicant's claimed process, namely dissolution and

recovery of nylon. It would also, perhaps more importantly, destroy the purpose of Yang et al., namely the decolorization of nylon.

In summary, one of ordinary skill in this art would not have been motivated to combine the teachings of Meyer with those of Yang et al. because (1) the nylons are completely different (and the dissolution temperatures disclosed in Meyer are specific to his long chain nylon) and (2) the purposes of the process of Yang et al. are completely different from those of the process of Meyer. Even if such a combination were made, however, it would still not teach the claimed invention, since Meyer does not contain any disclosure that any incidental nylon 6,6 or nylon 6 added to the powdered coating composition would (1) dissolve and (2) not degrade or react. Applicant respectfully submits that, for at least these reasons, the Examiner has failed to establish a prima facie case of obviousness, and that this rejection should be withdrawn.

B. YANG ET AL. AND BOOIJ

In paragraph 5 of the Office action, the Examiner has rejected claims 10 and 11 under 35 U.S.C. § 103(a) as obvious over Booij (U.S. Patent No. 5,840,773). Applicant respectfully traverses this rejection and requests reconsideration and withdrawal thereof.

As with Meyer, Booij does not cure the deficiencies of Yang et al. because it does not disclose the inventive concept recited in Applicant's claims: low temperature dissolution combined with high pressure to yield short dissolution times.

Moreover, Applicant is somewhat confused by the reassertion of this rejection. For one thing, at page 8 of the Advisory Action dated December 31, 2003, the

Examiner indicated that this rejection was withdrawn. The Examiner has not provided any explanation as to what changes in Applicant's claims have caused her to reverse herself and reassert the Booij reference against the claims. Secondly, the text of the rejection over Booij references Meyer, which is not included in the statement of rejection. Applicant respectfully requests that either the rejection be withdrawn, or that the Examiner provide clarification of exactly what rejection she is making. Applicant requests that such clarification be made in a non-final Office action, so that Applicant has a meaningful opportunity to respond with amendments, arguments, and/or evidence that is considered as of right.

C. YANG ET AL. AND SCOTT

In paragraph 6 of the Office action, the Examiner has rejected claims 12 and 13 under 35 U.S.C. § 103(a) as obvious over Yang et al. in view of Scott (U.S. Patent 2,742,440). Applicant respectfully traverses this rejection and requests reconsideration and withdrawal thereof.

Again, Scott fails to cure the deficiencies of Yang et al. described above. The Examiner cites Scott as allegedly teaching the use of an inert gas in a process for dissolving and precipitating nylon. However, Scott teaches a dissolution temperature above 160 °C, and requires elevated pressure to achieve dissolution at these high temperatures. Neither Scott nor Yang et al. teach or suggest that, by increasing the system pressure to a higher pressure (above the equilibrium vapor pressure for the solvent), a lower dissolution temperature can be used, and short dissolution times achieved, as recited in Applicant's claims. Absent some disclosure effectively linking the use of elevated pressure to the ability to decrease the dissolution temperature

while maintaining practical dissolution times, Applicant respectfully submits that the Examiner has failed to establish a prima facie case of obviousness, and the rejection should be withdrawn.

D. ANY PRIMA FACIE CASE OF OBVIOUSNESS IS REBUTTED

In addition to failing to teach or suggest the various elements of Applicant's claims as described above, the cited references fail in another regard. The entire point of Applicant's process is to recycle nylon without downgrading its quality as a result of the recycling process. In other words, a recycling process is particularly valuable if it is sustainable: it provides recycled product of sufficient quality that it is suitable for a use that is at least as highly valued as the use to which it had been previously put. Nylon carpet fiber is an extremely high valued use of nylon. Carpet fibers are highly engineered structures that require demanding performance characteristics of the nylon from which they are made. In order for recycled nylon to be suitable, it must have acceptable denier and tenacity. Described below are the results of various tests performed on recycled nylon obtained according to the claimed invention. The Examiner will note that the results obtained are surprising; one of ordinary skill in the art would have expected degradation of denier and tenacity in fibers made from recycled nylon, as compared to those obtained from virgin nylon fiber. As will be appreciated, obtaining recycled nylon suitable for spinning into fiber is a remarkable achievement in itself.

Obtaining recycled nylon which, when spun into fibers has properties as good as or better than those obtained for virgin nylon fibers is unprecedented, and wholly unexpected. This result, while possible using Applicant's claimed process, is not

even hinted at in any of the references cited by the Examiner. The ability of the claimed process to achieve such unexpected results is strong evidence rebutting any prima facie case of obviousness that might be said to exist. If the Examiner prefers that this evidence be presented in the form of a declaration, she is respectfully requested to contact the undersigned, as this can be provided in short order.

EXAMPLE

Sheared nylon 6,6 fibers from waste carpet was air elutriated and mixed with an ethanol solvent at a concentration of approximately 2.75 wt%. This mixture was heated to a temperature between about 138 °C and 143 °C at a pressure between about 425 psig and 460 psig in a coiled tube heat exchanger for less than 45 minutes (at a flow rate of between 1.32 gpm and 1.5 gpm). The equilibrium vapor pressure for ethanol at these temperatures is approximately 113 psig. The resulting solution was strained to remove undissolved solids, and flashed into a crystallizer tank at a temperature of about 115 °C to about 125 °C. The precipitated nylon was concentrated, dried and obtained as powdered nylon. In order to efficiently dry the material, nylon obtained from a previous run through the process was backmixed into the concentrated nylon/solvent stream fed to the drier.

The nylon powder was further dried to a moisture content of 500 ppm, pelletized, and extruded through a filter pack and spinnerette to produce nylon fiber. The denier and tenacity of this fiber were tested. The denier was found to be 2429 and the tenacity was surprisingly found to be 3.11 lb. This tenacity is surprisingly good because it is at the upper limit for tenacity specifications for drawn virgin nylon fiber.

The nylon fiber obtained above was spun into yarn and tufted into Lutradur primary carpet backing having a Glasbac backing, at a face weight of 17 oz/yd². Various tests were performed on the resulting carpet, which are provided in the table below.

| TEST | RESULT |
|------------------------------|------------------|
| Art 5 yr (Dry) Maintenance | 8.25 |
| Art 5 yr (Wet) Maintenance | 8 |
| Burrough's Resistance | 9083 meg |
| Delamination - Dry | No separation |
| Fluorine | 2322 |
| IBM Resistance | 3783 meg |
| Light Fastness | 2-3 (60 AFUs) |
| Nitrogen Dioxide | 4-5 (2 cy.) |
| Ozone Fading | 4-5 (2 cy.) |
| Radiant Panel | .70 |
| Radiant Panel - 15 min. | .78 |
| Smoke - Flaming | 166 |
| Smoke - Flaming - 4 min. | 131 |
| Smoke - Non-flaming | 438 |
| Smoke - Non-flaming - 4 min. | 66 |
| Stain (red dye 40) - 24 hour | 10 |
| Tuftbind - Dry | 8.66 lb |
| Vetterman Drum | 1.5 @ 22,000 cy. |

These tests indicate that fiber prepared according to the process claimed in the above-mentioned patent possesses properties making it suitable for use as carpet fiber. This is surprising because it would have been expected that degradation of fiber properties during initial use as carpet face cloth, and or during the dissolution process, would diminish the utility of the fiber for carpet facecloth.

Applicant submits that the present application is in condition for immediate allowance, and an early notification to this effect is earnestly solicited.

The Commissioner is hereby authorized to charge any deficiencies or credit any overpayment to Deposit Order Account No. 11-0855.

Respectfully submitted,



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